

A New Species of *Microscolex* (*Diplorema*) (Annelida: Oligochaeta) from New South Wales

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A new species of *Microscolex* (*Diplorema*), the first record of the subgenus from New South Wales, is described and figured. This species, defining the known southerly limit of *Diplorema* in Australia, is shown to have close affinities with the subgeneric type, *D. fragilis*. These species, together with an undescribed form from Ban Ban Springs, Queensland, appear to form a discrete species-group quite distinct from more northerly representatives of the subgenus.

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INTRODUCTION

The endemic Australian acanthodriline earthworm subgenus *Microscolex* (*Diplorema*) contains sixteen described species, with a distribution extending from Gayndah (S.E. Queensland) to North-Western Australia, including a large nucleus of species in the Northern Territory. Spencer (1900) erected the genus *Diplorema* (type, *D. fragilis*) on the basis of the arrangement of the male terminalia, the openings of the vasa deferentia and prostatic ducts supposedly separate, but both on segment XVIII. Stephenson (1930) in devising an elaborate phylogenetic scheme, incorporated *Diplorema* as a necessary intermediate between the primitive acanthodrilin condition (male pores on XVIII, two pairs of prostatic pores on XVII and XIX), and the more advanced megascolecin condition, with combined male and prostatic pores.

However, re-examination of Spencer's material (Jamieson, 1971) showed the original description to be grossly erroneous, *D. fragilis* in fact having the acanthodrilin arrangement of male terminalia. The redefined *Diplorema* could not then maintain separate status from the type of *Eodrilus*, *E. cornigravei* Michaelsen, 1907, and consequently the large number of species formerly assigned to this genus were regrouped (Jamieson, 1971). Those forming an homogeneous assemblage with *D. fragilis* with respect to Australian endemicity and the possession of modified genital setae remained in *Diplorema*, whilst the majority of species were placed in *Notiodrilus* Michaelsen, 1950. Subsequent analysis (Jamieson, 1974) resulted in the relocation of the entire complex (as subgenera *Notiodrilus* and *Diplorema*) in *Microscolex* Rosa, 1887, largely because the microscolecin arrangement of combined male and prostatic pores on XVII, characteristic of *Microscolex*, had been shown in some instances to vary to the acanthodrilin condition intraspecifically (Pickford, 1932). A re-examination of the type-species of *Notiodrilus*, *N. georgianus* Michaelsen 1888, demonstrated sufficient differences from the type of *Microscolex*, *M. phosphoreus* (Dugès 1837) to warrant subgeneric rank for *Notiodrilus*. This subgenus, within *Microscolex*, embraced a small number of species with vesiculate

nephridia and a distinctive setal arrangement; *Diplotrema* was incorporated as a third subgenus within *Microscolex*, differing from *Notiodrilus* primarily in the universal occurrence of genital setae within the species of *Diplotrema* recognized at that time (Jamieson, 1974).

Finally, a study of a number of new *Diplotrema* species from the Northern Territory, Australia, which exhibited marked variation in the arrangement of genital setae, and which included species lacking such setae, led to a further redefinition of the subgenus (Jamieson and Dyne, 1976). *Diplotrema* nevertheless retains a pronounced morphological and endemic identity.

SYSTEMATIC DESCRIPTION

Genus *MICROSCOLEX* Rosa, 1887

Subgenus *DIPLO TREMA* Spencer 1900 Emend.

Diplotrema tyagarah sp. nov.

Fig. 1 A-D, table 1

Material Examined: 149° 49' E, 30° 07' S, 26 km north of Narrabri on Newell Highway, in black moist clayey soil under dry grass, W. Nash and R. Raven, 19 July 1975 — Holotype (H) (AM W 6622), paratype, P1 (AM W 6623); 149° 37' E, 29° 49' S, 42 km south of Moree on Newell Hwy, in black clayey soil, just below surface in flat grassy country, W. Nash and R. Raven, 19 July 1975 — Paratype, P 2 (AM W 6624). 1 = 51, 49.5 + mm (posterior amputee); w (midclitellar) = 2.2, 2.1 mm; s = 142, 76 +; (H, P1). Form uniformly circular in cross-section; pigmentless buff in alcohol. Prostomium epilobous $\frac{1}{3}$, peristomium somewhat furrowed. First dorsal pore 7/8. Setae 8 per segment, in regular longitudinal rows throughout, setae *a* and *b* of XVII and XIX modified as penial setae; setae *a* and *b* modified as spermathecal genital setae in VII but absent from XVIII.

Nephropores inconspicuous on the clitellum (in *cd?*). Clitellum annular, strongly developed, XIII-XVII (extending dorsally into $\frac{1}{2}$ XII) setae visible on the clitellum, intersegmental furrows faint, dorsal pores obscured. Male pores minute orifices in broad seminal grooves, in mid-XVIII, slightly later of *b*-lines; prostatic porophores 2 pairs, in XVII and XIX, on slight protruberances forming the four corners of a roughly square male field, delimited laterally by a pair of broad seminal grooves joining the prostatic porophores; within the male field a diamond arrangement of small elliptical markings, each a slightly glandular area with pore-like centre, in 17/18 and 18/19; a large transversely elliptical tumescence with raised rim and median ridge, with slightly sunken centre in XVI, pressing anteriorly to meet the indented posterior edge of the clitellum; a diffusely glandular area immediately posterior to the male field, extending to 20/21, and within it, a faintly visible marking, similar to those within the male field, median, in XIX, close to 19/20.

Female pores conspicuous openings presetally in *ab* (closer to *a*) near intersegment 13/14, in XIV, surrounded by an elliptical, paler region on the clitellum. Spermathecal pores 2 pairs, closely paired in *a*-lines in 7/8 and 8/9, on protruberant lips. A large pair of glandular swellings in VII associated with the genital seta follicles, extending laterally to *c*, and filling the segment.

Septa 6/9-10/11, slightly thickened, 6/7-8/9 moderately strongly thickened, 5/6 moderately thickened. Dorsal blood vessel single, continuous onto pharynx. Last hearts in XIII, supraoesophageal vessel IX-XIII, adherent to roof of oesophagus; commissurals in X-XIII larger than the remainder, and sending a narrow connective

TABLE I
 Intersetal Distances in Segment XII of *M. (Diploptrema) tyagarah*
 % of circumference

	aa	ab	bc	cd	dd	dc	cb	ba	u (in mm.)
HOLOTYPE	9.3	2.1	14.5	2.1	51.8	1.9	16.0	2.3	5.25
PARATYPE 1	11.8	2.2	14.3	1.6	51.2	1.8	15.0	2.0	5.51
PARATYPE 2	10.3	2.5	15.3	2.0	51.3	2.0	14.0	2.5	4.37
mean	10.5	2.3	14.7	1.9	51.4	1.9	15.0	2.3	5.04

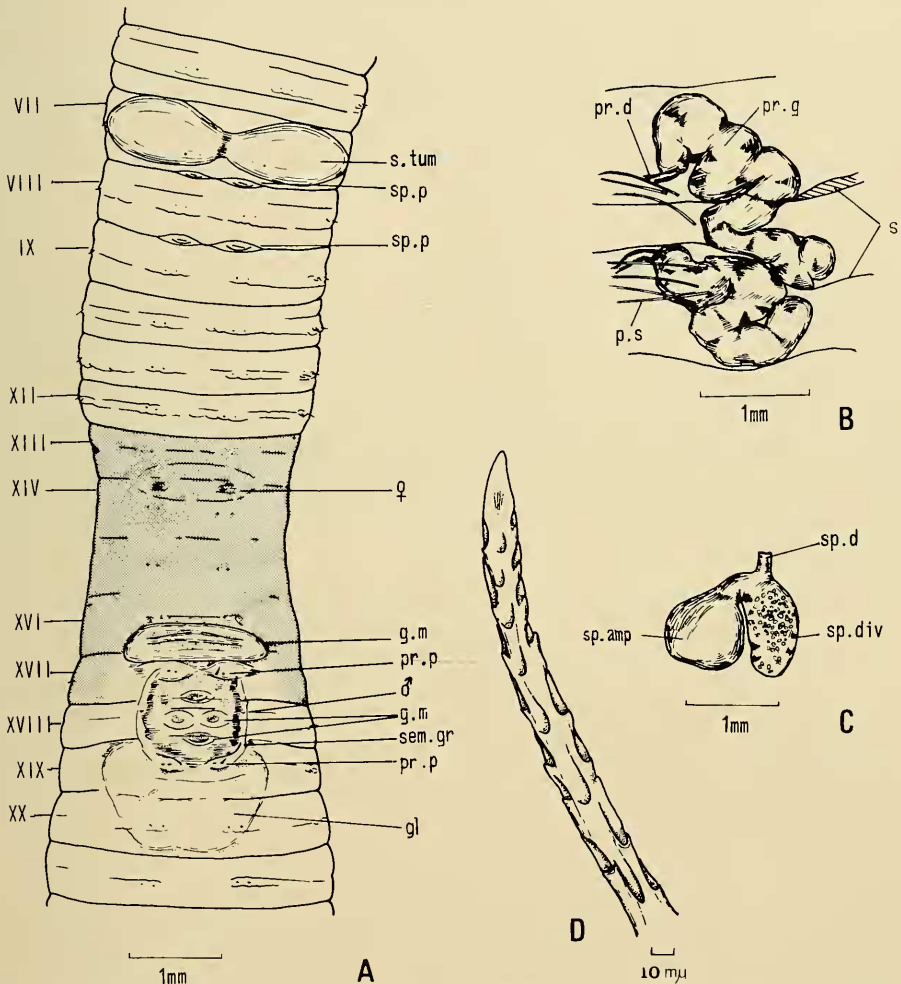


Fig. 1. *M. (Diploptrema) tyagarah* sp. nov. A.— Genital field of Holotype. B.— Right prostates of Holotype *in situ*. C.— Right spermatheca (IX) of Holotype. D.— Mature genital seta from Holotype.

Abbreviations used in illustrations and text: gl — glandular area; g.m — accessory genital marking; pr.p — prostatic pore; pr.d — prostatic duct; pr.g — prostate gland; p.s — penial seta; s — septum; s.tum — tumescence associated with genital setae; sem.gr — seminal groove; sp.amp — spermathecal ampulla; sp.d — spermathecal duct; sp.div — spermathecal diverticulum; sp.p — spermathecal pore; ♂ — male pore; ♀ — female pore; H — holotype; P — paratype; l — length; w — width; s — number of segments; u — total circumference.

to both the dorsal and supraoesophageal vessels, remaining commissurals very small and dorso-ventral only. Gizzard small-medium, soft and compressible, in V; oesophagus VI-XIV, rather narrow, not well vascularized, with conspicuous rugae on its inner walls; intestinal origin in XV, with abrupt expansion, a definite typhlosole absent. Nephridia stomate holonephridia throughout, the medium sized nephrostomes preseptal and usually in *ab*; the wide, thin-walled ducts entering the parietes slightly pre-setally in *cd*; the nephridial body invested in a high peritoneum appearing as a discrete sheaf of tissue in each segment; no tufting demonstrable in the pharyngeal region. Holandric; large flocculent sperm masses and very large, brightly iridescent sperm funnels in X and XI; seminal vesicles ill-defined, 2 pairs, one very small pair in IX, and a more prominent mass in XII, with apparent stalk-like connection to the funnels of the preceding segment. Coiled, tubular prostate glands 2 pairs, in XVII and XIX, somewhat flattened, and with stout muscular ducts; the anterior pair conspicuously the larger encroaching into XVIII. Penial seta follicles thin and transparent, with little copulatory musculature; *a* and *b* follicles conjoined; the setae moderately long, ectally tapering shafts with some irregular blunt toothing on the distal eighth. Length of mature seta = 1.54 mm; midshaft diameter = 19.2 μm (mean of 3).

Ovaries in XIII, comprising small sheafs of oocytes and large pleated funnels. Spermathecae 2 pairs, subequal, in VIII and IX, each comprising a bulbous, ovoid ampulla joined by a short stalk to a clavate diverticulum, the walls of which are packed with innumerable iridescent spheroidal sperm chambers; whereas the ectal duct and diverticulum appear continuous, the stalked ampulla appears to be an appendage. Length of right spermatheca of IX (from apex of ampulla to pore) = 1.5 mm; total length = 5.6 \times length of duct and 1.4 \times length of diverticulum. Genital seta follicles conspicuous in VII, *a* and *b* follicles inseparable; the setae stout shafts conspicuously ornamented with deep longitudinal notching which becomes more elongate entally; length of mature seta = 0.65 mm, midshaft diameter = 22.2 μm (mean of 2).

Remarks:

Diploptrema tyagarah is readily distinguishable from the remainder of the subgenus by the unique configuration of genital markings associated with the male field. The closest affinities of the species lie with the subgeneric type, *D. fragilis*, with which it shares such characters as similar general appearance of the genital field and clitellum, identical position of the first dorsal pore, lobular peritoneum-invested nephridial bodies, intestinal origin in XV, and a striking similarity in the form of the spermathecae. *D. tyagarah* is nevertheless separable on the basis of genital field details and setal ratio data.

DISCUSSION

Diploptrema tyagarah constitutes the first record of *Diploptrema* from New South Wales, extending the distributional range of the subgenus southwards by some 480 kilometres. The species thus forms the southernmost limit of a staggered chain of *Diploptrema* species extending from the Northern Territory, across to Cape York, and down the eastern coast of Queensland.

Despite remoteness from northern relatives, *D. tyagarah* has maintained most of the characteristics which contribute to the homogeneity of the subgenus as a whole, including holandry, possession of peculiarly modified setae in the vicinity of the spermathecae, retention of penial setae, and consistency in the number of spermathecae and their diverticula.

Together with an undescribed species from Ban-Ban Springs (S.E. Qld), *D. tyagarah* and the subgeneric type, *D. fragilis* form a morphologically compact aggregate rather distinct from the more northerly representatives of the subgenus (*vide* Jamieson and Dyne, 1976 for descriptions and key). Radiation from a common ancestry is likely to have taken place within the last 10-50 thousand years, when increasing post-Pleistocene aridity was effectively isolating numerous earthworm populations. The members of species-groups have presumably resisted such isolating factors for a longer period, and remain closely related at the present time. More intensive collecting in and near the regions separating *D. tyagarah* from its close allies may reveal further isolates of similar affinities.

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